

Claims

What is claimed is:

1. A system for monitoring and regulating a development process, comprising:
 - at least one development component operative to adapt one or more development parameters associated with developing a photoresist on at least one portion of a wafer;
 - a development component driving system for driving the at least one development component;
 - a system for directing light toward one or more gratings located on at least one portion of the wafer;
 - a development monitoring system operable to measure development progress from light reflected from the one or more gratings; and
 - a processor operatively coupled to the development monitoring system and the development component driving system, wherein the processor receives a development progress data from the measuring system and analyzes the development progress data by comparing the development progress data to stored development data to generate a feed-forward control data operative to control the at least one development component.
2. The system of claim 1, the development monitoring system further comprising a scatterometry system for processing the light reflected from the one or more gratings.
3. The system of claim 2, the processor being operatively coupled to the scatterometry system, the processor analyzing data received from the scatterometry system and producing an analyzed data and the processor controlling, at least in part, the at least one development component *via* the development component driving system based, at least in part, on the analyzed data.

4. The system of claim 1, the development monitoring system further comprising a reflectometry system for processing the light reflected from the one or more gratings.
5. The system of claim 4, the processor being operatively coupled to the reflectometry system, the processor analyzing data received from the reflectometry system and producing an analyzed data and the processor controlling, at least in part, the at least one development component *via* the development component driving system based, at least in part, on the analyzed data.
6. The system of claim 3, the development monitoring system further comprising a reflectometry system for processing the light reflected from the one or more gratings.
7. The system of claim 6, the processor being operatively coupled to the reflectometry system, the processor analyzing data received from the reflectometry system and producing an analyzed data and the processor controlling, at least in part, the at least one development component *via* the development component driving system based, at least in part, on the analyzed data.
8. The system of claim 3, wherein the scatterometry system is operable to detect a development end point and where the feed-forward control data is employed to terminate development.
9. The system of claim 5, wherein the reflectometry system is operable to detect a development end point and where the feed-forward control data is employed to terminate development.
10. The system of claim 7, wherein the scatterometry system is operable to detect a development end point, where the reflectometry system is operable to detect a development end point and where the feed-forward control data is employed to terminate development.

11. The system of claim 8, the processor logically mapping the wafer into one or more grid blocks and making a determination of the acceptability of a development value in the one or more grid blocks.

12. The system of claim 11, wherein the processor determines the existence of an unacceptable development value for at least a portion of the wafer based on comparing one or more measured development values to one or more stored development values.

13. The system of claim 12, wherein the processor employs a non-linear training system in computing feed-forward control data operable to adjust the at least one development component.

14. The system of claim 9, the processor logically mapping the wafer into one or more grid blocks and making a determination of the acceptability of a development value in the one or more grid blocks.

15. The system of claim 14, wherein the processor determines the existence of an unacceptable development value for at least a portion of the wafer based on comparing one or more measured development values to one or more stored development values.

16. The system of claim 15, wherein the processor employs a non-linear training system in computing feed-forward control data operable to adjust the at least one development component.

17. The system of claim 10, the processor logically mapping the wafer into one or more grid blocks and making a determination of the acceptability of a development value in the one or more grid blocks.

18. The system of claim 17, wherein the processor determines the existence of an unacceptable development value for at least a portion of the wafer based on

comparing one or more measured development values to one or more stored development values.

19. The system of claim 18, wherein the processor employs a non-linear training system in computing feed-forward control data operable to adjust the at least one development component.
20. A method for monitoring and regulating a development process comprising:
logically partitioning a wafer into one or more portions;
fabricating one or more gratings on the wafer;
directing an incident light onto at least one of the one or more gratings;
collecting a reflected light reflected from the at least one grating;
measuring the reflected light to determine one or more critical dimensions associated with the at least one grating;
computing one or more adjustments for one or more development components by comparing the one or more critical dimensions to scatterometry signatures associated with one or more stored critical dimensions; and
adjusting the development process based, at least in part, on the one or more adjustments.
21. The method of claim 20, further comprising processing the reflected light in a scatterometry system.
22. The method of claim 21 wherein computing the one or more adjustments is based, at least in part, on data received from the scatterometry system.
23. A method for monitoring and regulating a development process comprising:
logically partitioning a wafer into one or more portions;
fabricating one or more gratings on the wafer;
directing an incident light onto at least one of the one or more gratings;
collecting a reflected light reflected from the at least one grating;

measuring the reflected light to determine one or more critical dimensions associated with the at least one grating;

computing one or more adjustments for one or more development components by comparing the one or more critical dimensions to reflectometry signatures associated with one or more stored critical dimensions; and

adjusting the development process based, at least in part, on the one or more adjustments.

24. The method of claim 23, further comprising processing the reflected light in a reflectometry system.

25. The method of claim 24 wherein computing the one or more adjustments is based, at least in part, on data received from the reflectometry system.

26. A method for monitoring and regulating a development process comprising:
logically partitioning a wafer into one or more portions;
fabricating one or more gratings on the wafer;
directing an incident light onto at least one of the one or more gratings;
collecting a reflected light reflected from the at least one grating;
measuring the reflected light to determine one or more critical dimensions associated with the at least one grating;
computing one or more adjustments for one or more development components by comparing the one or more critical dimensions to at least one of scatterometry signatures and reflectometry signatures associated with one or more stored critical dimensions; and
adjusting the development process based, at least in part, on the one or more adjustments.

27. The method of claim 26, further comprising processing the reflected light in at least one of a scatterometry system and a reflectometry system.

28. The method of claim 27 wherein computing the one or more adjustments is based, at least in part, on data received from at least one of the scatterometry system and the reflectometry system.
29. A system for monitoring and regulating a development process, comprising:
means for partitioning a wafer into one or more grid blocks;
means for sensing the acceptability of development in at least one of the one or more grid blocks;
means for controlling the development of a wafer portion; and
means for selectively controlling the means for development.
30. The system of claim 29 where the means for controlling the development of a wafer portion comprise means for terminating the development process.